Computers in the Consultation
The UK Experience

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ABSTRACT

In the UK 50% of primary care physicians are using electronic medical records in real time during the consultation. Some have given up using manual records at all. This paper describes the reasons they have implemented electronic medical records for progress notes during a consultation and the way such records improve the care given to individual patients. The essence of the argument is that doctors make decisions whilst they are with the patient. It is therefore essential that any assistance the computer can offer is available during every consultation.

INTRODUCTION

In the UK 90% of primary care physicians work in computerised practice. Some of these practices only use computers for administration but over 50% of all primary care physicians use computers during the consultation for recording progress notes.[1] It is estimated that approximately 10% of these physicians have dispensed with manual records and rely solely on the electronic medical record.[2]

Computerised medical records are gaining ground in many countries. The impetus for the installation of these machines has been primarily administrative. To improve billing and accounting. To ensure maximum claims for item of service payments, to enable screening and health promotion activities. The initial implementation of computers in UK primary care was driven by the need to provide administrative and medical audit information to cope with changes forced on doctors by the Department of Health.

Epidemiologists, health care planners and researchers have become interested in using data collected by primary care systems. However the evidence published up to now has thrown doubt on the reliability of information collected by doctors in the normal course of their work as opposed to that collected by doctors who have a research interest.[3]

Most primary care physicians are not interested in research and have only a peripheral interest in administration. They are only concerned with recording data for individual patient care. Manual records provide for most of their needs in this respect. Many early UK systems were primarily designed to collect data without providing any immediate added value to the doctor.

Computers in the consultation pose many problems. They require the learning of new skills. They can increase the time taken. They can interfere with the doctor - patient interaction. They are expensive and some doctors and patients are anxious about their effect on confidentiality. Their real time use during the consultation is only acceptable if they provide some added value that is not attainable by the real time use of manual records. If it can be shown that they have such added value then it is worthwhile doctors taking the time to overcome the problems outlined above.

BETTER STRUCTURED RECORDS

There have been several attempts to improve the structure of the manual record to assist the doctor in providing better care. The best known are Problem Oriented Medical Records (POMR). [4]. The success of such records depends on a disciplined approach by doctors to recording data. Doctors have been reluctant to adopt such constraints and that may explain the poor take up of POMRs. Most of the UK electronic medical record keeping systems allow records to be displayed and entered in a POMR form without imposing strict rules on the doctor. They lead a doctor naturally to record data items in a logical place in the record but they also allow virtually free form recording with the software subsequently arranging the data in a structured manner.

The ability of the computer to provide different views of the data makes the record much more valuable during the consultation. A manual record can have the various elements recorded in some sort of structure but this requires the doctor to be assiduous in the manner of recording. The computer can produce its own structure.

A Journal type of display that shows every item in chronological order has some value in showing the time structure of events but is less easy to use than on paper. The computer shows data items in problem oriented form which helps the user assess

each problem more effectively. Problems are shown as active or dormant problems. Individual items may be linked to more than one problem. Thus a blood pressure reading may be shown under a problem heading of hypertension as well as under a problem of ischaemic heart disease.

The computerised record also displays the information according to type. Thus all the data items relating to preventative medicine or investigations can be viewed by type even though they may have been recorded under the problem they relate to. Patient related letters are particularly useful to have recorded within a problem. It is valuable to be able to browse old discharge or referral letters whilst with the patient. These letters will have been written by a word processor that is integral with the medical record. This allows most of the contents of the letter to be automatically assembled by the machine before the senders' comments are added as free text. Such data items as destination address, patient demographic details, previous medical history, medication, allergies and history of the active problem are inserted automatically thus enhancing the quality of the letter.

The computer's ability to search easily and quickly for a particular event also helps the consultation. In an extensive set of manual case notes the doctor may find it difficult to check on a particular item. In the electronic record all items are available at a few key strokes.

In the UK it has been suggested that the flexibility and comprehensive nature of the electronic medical record improve the ability of the doctor to be aware of the whole patient history at every consultation.[5] One hopes that this improves patient care. It certainly gives the doctor an incentive to use the computer actively while with the patient.

PRESCRIBING SUPPORT
In the hospital environment there are multiple checks on prescribed items. The prescription is seen by all the ward staff. It is checked by the pharmacist who has direct access to the prescriber. In the doctor's office the only checks are those of the prescriber themselves and the community pharmacist who has no knowledge of the patient nor access to their records. Errors due to inappropriate prescriptions are common. Computerised checking of the prescription becomes a reality if the medical record and the prescription are part of a real time system.

In the UK most primary care physicians now use computerised prescriptions.[1] The standards for such systems have been described.[6]

The first requirement is that all drugs have to be issued from a pre-defined drug database. This holds the following details:

- Drug Names, Generic and Proprietary
- Available formulations
- Available Pack sizes
- Standard Doses and advice
- Known Contra-indications
- Potential Interactions
- Cost

When the user enters a drug name for a prescription the computer looks up the database and displays appropriate formulations and doses. These should be specific for the age and sex of the patient. This avoids errors such as a child receiving an adult dose. The doctor makes a selection and is then presented with standardised quantities or pack size. The computer then checks the patient's medical history to ensure that the patient does not have a known condition that is a contra-indication or that the patient is not already taking a drug which interacts. It also checks to ensure that the patient is not known to be allergic to the drug or has had to stop taking that drug before for whatever reason. If a potential problem is highlighted the doctor still has the opportunity to override the controls if clinically indicated. Potential drug interactions are graded in severity to allow the doctor to assess the scale of the problem.

Many patients are on long term medication. The information supplied to the doctor at the time of prescribing allows for monitoring of this medication. The computer issues warnings if a patient has taken a particular drug for apparently excessive periods of time or if they seem to have been prescribed inappropriate quantities of the drug over time.

As long as the doctor is using a real time record the computer provides checks that take into account more information than a doctor can carry in his or her head. The prescription is checked no matter how much time pressure the doctor is under or if the doctor is tired or distracted. The final choice and resulting responsibility rest with the physician.

The computer can also provide significant information about the possible choices of drugs but this is dealt with in the section on "on line information"

INTERACTIVE PROTOCOLS

Doctor initiated

Standard protocols of care can be determined by the clinician and then built into the electronic record. If the doctor wishes, the user is then assisted through an encounter by the record that follows the guidelines laid down in the protocol. This allows for standardised patient care, it aids the doctor with decision making and allows care to be delivered by non-medically qualified personnel who will be guided by the computer and warned if they need medical intervention in any particular case. This sort of routine is particularly suitable to the care of chronic disease such as asthma, hypertension and diabetes.

UK physicians have only recently come to accept that the adoption of standardised protocols, agreed with their peers, are one way to improve patient care and reduce the risks of litigation. The increasing shift of chronic disease management to primary care has accelerated this change. More and more patient care is being delivered by primary care teams with increasing use of nurses and other paramedical staff. Electronic protocols, designed by the doctors themselves, allow the computer to monitor the individual patient care. The most popular protocol generating software in the UK is SOPHIE. (Screening Of Patients in an Interactive Environment) This is an add on package for the most widely used medical record keeping system.(AAH Meditel's System 5) Although it is an add on it is completely integrated into the medical record and the interface with the user is seamless. Such protocols remind the doctor if required data has not been collected or if agreed steps have not been taken. They also flag up any discrepancies in the information that may indicate the patient needs different interventions. Thus if the smoking history of an asthmatic is not known or there has not been a recent recording of the blood pressure of a woman on the oral contraceptive the protocol initiates a warning to the doctor in real time. There are significant advantages of dynamic electronic protocols over paper versions. The computer only asks questions that are relevant to that patient, e.g. it will not ask about PAP smear status in a man. Redundant questions are avoided because the electronic protocol checks the existing patient record before asking a question. The warnings or advice issued by the protocol are designed by the user and therefore specific to local circumstances. Such protocols also do immediate calculations. If the height and weight are known they can advise the doctor of the Body Mass Index ratio or the expected peak flow value for that patient. All this is only possible because the protocols are an integral part of the medical record system and are used in real time during the consultation. The protocols also reassure doctors that certain aspects of patient care can be safely devolved to nurses. The doctor can ensure that the protocols warn the nurses whenever there is evidence that medical intervention is required.

Automatic initiation

Electronic records allow the implementation of hidden rules that govern the way information is displayed to the doctor. SOPHIE type protocols are widely used in the UK for this purpose. Thus the doctor is prompted by the record if the patient needs a particular preventative action such as vaccination or PAP smear. The computer is programmed to look for the existence of information within the record about pre-defined health actions. If they are not present a warning is displayed to the user. The areas that this feature is used in include:

- The absence of administrative data about fees the doctor may be able to claim,
- the need for particular investigations if a particular sign or symptom exists e.g. the need to test for glycosuria in a patient suffering from boils,
- The need to ask the patient about relevant history, e.g. to ask about a family history of diabetes in the patient with boils.

Extensive records often hold information that can provide the clues for diagnosis and management. Manual records, even if highly structured, require the user to search through to find the information. This takes time and is not feasible unless the user knows that such information exists. Rules incorporated in the electronic record using SOPHIE help to ensure that such information is looked for. E.g. if a patient has a chronic cough the computer can check the patient's occupational history to see if there has been exposure to pulmonary irritants. If the doctor takes a full history on every occasion this should be unnecessary. However, doctors tend to skim over details if it is a repeat encounter. Doctors are also prone to be tired, unwell or just forgetful. They all work under significant time constraints. Simple rules can allow the real time use of the computer record to help.

ON LINE INFORMATION

No doctor can carry all the available information in his head. The electronic record contains databases of medical information that are kept up to date at regular intervals. The information is available to the user on request. The access to this information can either be by means of the user searching for what he wants as in using the index as in a book or

it can allow subject specific display of information, e.g. if the user enters a particular condition in the patient's record, the machine can selectively display information on that condition.

Drug Information

The automatic checking of prescriptions is described above. However the provision of an on line database of therapeutic information provides the doctor with immediate assistance with the choice of medication. The most widely used in the UK is PHILEX. There two means of access. Direct access to information on a particular drug is available as a hot key when that drug is being prescribed. Alternatively, while still remaining within a patient record, the doctor can browse through drug information prior to making a choice. Such information includes preferential drugs for a particular condition, comparative costs of drugs, drugs by therapeutic class. At no time does the doctor have to leave the patient record. One unexpected benefit of using such information during the consultation is that the patient can see the same information. This allows them to be better informed and helps compliance.

Medical Information

Extensive medical databases, biased toward the individual doctors' needs are also available directly or for browsing. In the UK GPs have available a package called PMR (Personalised Medical Reference) which is particularly geared towards the needs of primary care physicians. The information can be looked up by key word search, by moving down hierarchical menus, by moving from data item to data item by predetermined links or by Hypertext type of navigation. This allows the trainee doctor to extend their knowledge, the generalist to find specialist knowledge or for every doctor to find information that has been forgotten or never learnt. It has also been found to be useful in educating patients. Information displayed on the screen gives the patient a visual image of an important concept that would otherwise on be assimilated by auditory input. It has been known for many years that patients only retain about 20% of spoken information. Although it has yet to be proved, it is hoped that seeing the same information on screen will improve their retention and allow them more involvement in their own health care.

Epidemiological Information

Work is now starting on providing on line information on local and national disease patterns. At present doctors rely on their own impressions of disease activity and this tends to be patchy. There is a common phrase used by UK primary care physicians. "There's a lot of it about". We hope to be able to give them the information to substantiate such claims in the near future.

Regulatory Information

Notices from Drug Safety Agencies, Department of Health bodies and other organisations deluge every doctor. The volumes are such that no one can be aware of it all. However lawyers in litigation cases assume it should be known. If it is available in a dynamic, easily searchable manner during the consultation doctors are more likely to know about it at the time when it is needed, i.e. whilst they are with the patient.

CONCLUSION

The UK has a large number of primary care physicians using real time electronic medical records during the consultation. They only do this because they can see added value from these records. They find the electronic record useful and they are therefore beginning to record more meaningful and complete data on patients. It is hoped that this also improves the care of each individual patient.

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